This listing of claims will replace all prior versions, and listings, of claims in the application:

In the Claims:

1. (Original) A method for producing nanometer-sized products comprising:

mixing a first precursor reactant, a second precursor reactant, a surface-stabilizing surfactant, and a high boiling point liquid to form a mixture;

forming a mist of droplets of the mixture;

heating the droplets to cause a reaction between species of the first and second precursor reactants to form nanometer-sized products within the heated droplets; and

collecting the nanometer-sized products.

2. (Original) The method of claim 1, wherein the step of heating the droplets is done in a furnace.

3. (Original) The method of claim 1, wherein the step of forming a mist of droplets of the mixture is performed in a nebulizer, ultrasonic nebulizer, or other mist generator.

4. (Original) The method of claim 1, wherein the step of forming the mist of droplets is performed by a first device, and the step of heating the droplets is performed by a second device.

5. (Original) The method of claim 4, wherein the first device is a nebulizer ultrasonic nebulizer, or other mist generator.

6. (Original) The method of claim 4, wherein the second device is a furnace.

7. (Original) The method of claim 4, including the step of carrying the mist of droplets from the first device to the second device using a carrier gas.

8. (Original) The method of claim 7, wherein the carrier gas is an inert gas.

9. (Original) The method of claim 7, wherein the carrier gas is a chemically active gas.

10. (Original) The method of claim 1, wherein the heated droplets each have a volume of about 1×10^{-20} L to 1×10^{-10} L.

11. (Original) The method of claim 10, wherein the heated droplets each have a volume of about 1×10^{-15} L.

12. (Original) The method of claim 1, wherein the step of heating is carried out at 100° to 400° C.

13. (Original) The method of claim 1, wherein the first precursor reactant comprises a cadmium compound.

14. (Original) The method of claim 13, wherein the first precursor reactant is selected from the group consisting of CdO, $Cd(NO_3)_2$, $CdCO_3$, Cd naphthenate, and $Cd(CH_3CO_2)_2$.

15. (Original) The method of claim 1, wherein the second precursor reactant comprises a selenium compound.

16. (Original) The method of claim 15, wherein the second precursor reactant is selected from the group consisting of phosphine chalcogenides or amine chalcogenides, including those selected from the group consisting of trioctylphosphine selenide, tributylphosphine selenide, triethylphosphine selenide, and selenium ethylenediamine complexes.

17. (Original) The method of claim 15, wherein the second precursor reactant is selected from the group consisting of elemental selenium dissolved in trioctylphosphine and ethylenediamine.

18. (Original) The method of claim 1, wherein the surfactant is selected from the group consisting of trioctylphosphine, trioctylphosphine oxide, stearic acid, hexadecylamine, oleic acid, and dodecylamine.

19. (Original) The method of claim 1, wherein the high boiling point liquid selected from the group consisting of trioctylphosphine, trioctylphosphine with dioctylamine, trioctylphosphine oxide, trioctylphosphine oxide with dioctylamine, stearic acid, hexadecylamine, oleic acid, and dodecylamine.

20. (Original) The method of claim 1, wherein the step of collecting the nanometer-sized products comprises the step of cooling the heated droplets.

21. (Original) The method of claim 1, wherein the step of collecting the nanometer-sized products comprises the step of causing the heated droplets to come into contact with a cold liquid, solid powder, or solid surface.

22. (Original) The method of claim 20 wherein the heated droplets are cooled using a solvent-filled bubbler.

23. (Original) The method of claim 1 wherein the first precursor reactant is selected from the group consisting of cadmium precursors and molybdenum precursors, and the second precursor reactant is a chalcogenide precursor.

24. (Original) The method of claim 1 wherein the first precursor reactant comprises a cadmium precursor and the second precursor reactant comprises a chalcogenide precursor selected from the group consisting of sulfur, selenium, and tellurium precursors.

25. (Original) The method of claim 24 wherein the cadmium precursor is selected from the group consisting of cadmium oxide, cadmium carbonate, cadmium naphthenate, and cadmium acetate and the chalcogenide precursor is selected from the group consisting of elemental sulfur, selenium, tellurium dissolved in tributylphosphine or ethylenediamine and trioctylphosphine chalcogenide.

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51. (Original) An apparatus for producing nanometer-sized products comprising:

a first precursor reactant source, a second precursor reactant source, a surface-stabilizing surfactant source, and a high boiling point liquid source to form a mixture;

a mist generator that forms a mist of droplets of the mixture;

a heating device to heat the droplets and to cause a reaction between species of the first and second precursor reactants within the heated droplets; and

a collecting device that collects the nanometer-sized products.

52. (Original) The apparatus of claim 51, wherein the heating device is a furnace.

53. (Original) The apparatus of claim 51, wherein the mist generator is a nebulizer or ultrasonic nebulizer.

54. (Original) The apparatus of claim 51, further including a carrier gas source, the carrier gas carrying the mist of droplets of the mixture from the mist generator to the heating device, and from the heating device to the cooling device.

55. (Original) The apparatus of claim 54, wherein the carrier gas is an inert gas.

56. (Original) The apparatus of claim 54, wherein the carrier gas is a chemically active gas.

57. (Original) The apparatus of claim 51, wherein the heated droplets each have a volume of about 1×10^{-20} L to 1×10^{-10} L.

58. (Original) The apparatus of claim 57, wherein the heated droplets each have a volume of about 1×10^{-15} L.

59. (Original) The apparatus of claim 51, wherein the heating device heats the droplets in a range of 100° to 400° C.

60. (Original) The apparatus of claim 51, wherein the first precursor reactant comprises a cadmium compound.

61. (Original) The apparatus of claim 51, wherein the first precursor reactant is selected from the group consisting of CdO, $Cd(NO_3)_2$, $CdCO_3$, Cd naphthenate, and $Cd(CH_3CO_2)_2$.

62. (Original) The apparatus of claim 51, wherein the second precursor reactant comprises a selenium compound.

63. (Original) The apparatus of claim 62, wherein the second precursor reactant is selected from the group consisting of phosphine chalcogenides or amine chalcogenides, including those selected from the group consisting of trioctylphosphine selenide, tributylphosphine selenide, triethylphosphine selenide, and selenium ethylenediamine complexes.

64. (Original) The apparatus of 62, wherein the second precursor reactant is selected from the group consisting of elemental selenium dissolved in trioctylphosphine and ethylenediamine.

65. (Original) The apparatus of claim 51, wherein the surfactant is selected from the group consisting of trioctylphosphine, trioctylphosphine oxide, stearic acid, hexadecylamine, oleic acid, and dodecylamine.

66. (Original) The apparatus of claim 51, wherein the high boiling point liquid selected from the group consisting of trioctylphosphine, trioctylphosphine with dioctylamine, trioctylphosphine oxide, trioctylphosphine oxide with dioctylamine, stearic acid, hexadecylamine, oleic acid, and dodecylamine.

67. (Original) The apparatus of claim 51, wherein the collecting device comprises a cold liquid, solid powder, or solid surface, or combination thereof.

68. (Original) The apparatus of claim 67, wherein the collecting device is a solvent-filled bubbler.

69. (Original) The apparatus of claim 51, wherein the first precursor reactant is selected from the group consisting of cadmium precursors and molybdenum precursors, and the second particle precursor reactant is a chalcogenide precursor.

70. (Original) The apparatus of claim 51 wherein the first precursor is selected from the group consisting of cadmium oxide, cadmium carbonate, cadmium naphthenate, and cadmium acetate and the second precursor is selected from the group consisting of elemental sulfur, selenium, tellurium dissolved in tributylphosphine or ethylenediamine and trioctylphosphine chalcogenide.

71. (Original) A method for producing nanometer-sized products comprising:

selecting a first precursor reactant and a second precursor reactant, the first and second precursor reactants capable of forming a compound,

mixing the first precursor reactant, the second precursor reactant, a surface-stabilizing surfactant, and a high boiling point liquid to form a mixture;

forming a mist of droplets of the mixture;

heating the droplets to cause a reaction between species of the first and second precursor reactants to form nanometer-sized products within the heated droplets; and

collecting the nanometer-sized products.

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